HSM-DC8
RAGSDALE (APM) DECORATOR
HIGH SPEED LOGIC MODULE
USER'S MANUAL

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WARNING

To ensure that the equipment described by this User Manual, as well as the equipment connected to and used with it, operates satisfactorily and safely, all applicable local and national codes that apply to installing and operating the equipment must be followed. This includes the National Electrical Code in the USA and other applicable legislation, regulations, and codes in practice elsewhere. Since codes can vary geographically and can change with time, it is the user's responsibility to determine which standards and codes apply, and to comply with them.

FAILURE TO COMPLY WITH APPLICABLE CODES AND STANDARDS CAN RESULT IN DAMAGE TO EQUIPMENT AND/OR SERIOUS INJURY TO PERSONNEL.

Persons supervising and performing installation or maintenance must be suitably qualified and competent in these duties, and should carefully study the User Manual and any other manuals referred to by it prior to installation and/or operation of the equipment.

The manufacturer accepts no liability for any consequences resulting from inappropriate, negligent or incorrect installation, operation, or adjustment of the equipment.

The contents of the User Manual are believed to be correct at the time of printing; however, no responsibility is assumed for inaccuracies. In the interests of a commitment to a policy of continuous development and improvement, the manufacturer reserves the right to change the specification of the product or it's performance or the contents of the User Manual without notice.

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SECTION 1
GENERAL DESCRIPTION

This section describes the features of the HSM-DC8 Ragsdale (APM) Decorator/Basecoater High Speed Logic Module. This includes the functional description, alarms detected, etc.

1.1 FEATURES

- Performs high speed control functions of the Ragsdale (APM) Decorator/Basecoater to speeds in excess of 2400 CPM.
- High speed front-end upgrade package which interfaces with existing control system.
- Accurate detection of misloaded cans and Odd/Even trip cam control eliminates inside deco and varnish problems.
- Accurate speed compensated single can (bad can) pin chain blow-off reduces scrap and eliminates silver cans down the line.
- Single select-a-can QC pin chain blow-off allows operator to blow off a can from a selected spindle (or blanket) to verify print quality of each blanket with machine running at full production speeds.
- Can gate open/close control.
- Alarm detection: infeed track jam, no can transfer (can on mandrel), and timing signal fail detection.
- Data Acquisition: Total number of good cans printed, total number of blow-offs, trips per spindle, etc. (for both current shift and last shift).
- Built-in 2 Line X 40 character sealed display with 24 key membrane keypad allows local viewing of collected data (can count, blow-off count, trips per spindle) by operator and set-up of all user variables (passcode protected or key switch enabled) by authorized personnel.
- Interfaces directly with machine mounted resolver, can/no can sensor and all trip and blow-off solenoids.

- Based on high performance M4503 PLC/PLS module which allows easy trouble-shooting and user customization using SYSdev (DOS-based) programming package.

- Built-in PLS provides all machine timing, eliminating need for an additional PLS.

- Can be used on all Ragsdale (APM) 24 mandrel Decorator and Basecoater models.

1.2 FUNCTIONAL DESCRIPTION

The HSM-DC8 Decorator/Basecoater high speed logic module is an electronic upgrade for the Ragsdale (APM) decorator/basecoater which detects miss-loaded cans, performs speed compensated trip cam control, and single can (bad can) blow-off at speeds in excess of 2400 CPM. In addition, the package provides select-a-can pin chain blow-off for print quality verification of each blanket.

Alarm detection is provided including: infeed track jam, no can transfer (can on mandrel), and timing signal failure. Data collection includes: Total good can count, blow-off counts, and trips per spindle (both for the current shift and previous (last) shift. The package interfaces directly to the machine mounted resolver, can/no can sensor, trip and blow-off solenoids as well as the host PLC via discrete DC I/O.

The package is not a dedicated "black box", but is instead implemented using the high performance SYSTEMS M4503 PLC/PLS module which allows easy customization by either SEA or the end user. The M4503 module is programmed using the DOS-based SYSdev programming package which allows the module to be programmed in any combination of Ladder or High-level (subset of "C"), as well as perform on-line monitoring and trouble-shooting. The M4503 module incorporates a built-in PLS which interfaces directly with the machine mounted resolver and provides all machine timing, eliminating the need for an external PLS.

1.3 ODD AND EVEN TRIP CAM CONTROL

Odd/Even trip cam control at speeds in excess of 2400 CPM is incorporated in the HSM-DC8. The appropriate trip cam (odd or even) is accurately extended for the spindle of the miss-loaded can and retracted back prior to spindle following the miss-loaded can at all speeds. This reduces scrap by providing an accurate single mandrel retract at all speeds. This eliminates inside litho problems by assuring that the miss-loaded spindle is completely skipped.

1.4 BAD CAN AND SELECT-A-CAN PIN CHAIN BLOW-OFF

Both the bad can pin chain blow-off and select-a-can pin chain blow-off incorporate speed compensation to compensate for the response time of the blow-off solenoids regardless of machine speed. This allows accurate rejection of a single can from the pin chain at speeds in excess of 2400 CPM. The bad can blow-off is activated automatically to reject miss-loaded cans from the pin chain.

The select-a-can feature allows the user to dial in a mandrel number, either at a remote PB station or from the keypad of the HSM-DC8, and blow-off one can printed on that mandrel. Mandrels 1 through 24 can be individually blown-off this way to verify the print quality of each mandrel. Two other select-a-can blow-off modes are also available: 12 and 24 can blow-off. The 12 can mode blows off 12 consecutive cans printed on blankets 1 through 12. The 24 can mode blows off 24 consecutive cans printed on all 24 mandrels, starting with mandrel 1.

The following variables can be set by the user for the bad can blow-off: number of shifts from machine to blow-off port (up to 999), number of cans to blow-off for each bad can (one is normal, can be up to 5) and both the "on" and "off" solenoid response time (used by the speed compensation algorithm). The following variables can be set by the user for the select-a-can blow-off: 1 to 24 shift offset which is used to match the actual mandrel number to the selected mandrel number, both the "on" and "off" solenoid response times.

1.5 ALARM DETECTION

The package detects the following alarms: infeed track jam, no can transfer (can on mandrel), and timing signal fail.

Infeed Track Jam: The infeed track jam alarm occurs when 7 consecutive empty mandrels are detected by the "can/no can sensor" after the can gate is opened. (B111.6 = 1 & B111.7 = 1)

No Can Transfer: The no can transfer alarm occurs when the "no can transfer sensor" detects a can on a mandrel after the disk transfer location. (B111.6 = 0 & B111.7 = 1)

Timing Signal Fail: The timing signal fail occurs when any of the timing signals generated in the PLS section fail to change state periodically while the machine is running. (B111.6 = 1 & B111.7 = 0)

The above alarms are available to the host PLC via discrete outputs (B111.6, B111.7). These should be used to stop the machine and indicate the problem when any one of the alarms occurs.

1.6 DATA COLLECTION

The following data is collected for both the current shift and the previous (last) shift:

1) Total number of good cans printed
2) Total number of cans blown-off
3) Total number of miss-loaded cans (bad cans)
4) Total number of restart blow-offs
5) Total number of manual blow-offs
6) Total number of select-a-can QC blow-offs
7) Total trips per spindle (for each spindle)

This data can either be viewed locally on the display or can be sent to the host PLC via RS-232 communications (MODBUS or Allen-Bradley DF1 protocols) using the optional S4516 communication board.

This information is updated ("current" shift transferred to "Last" shift) based on the change of state of a discrete input. This input can be activated on an 8 or 12 hour shift basis or alternatively could be activated manually on a label run basis depending on the user's preference.

In addition to the shift data collection, a separate buffer is available to collect trips per spindle counts as a diagnostics aid to the operator for trouble-shooting a loading problem on a specific mandrel. Unlike the shift data, these counts can be reset manually by the operator at will. This allows the operator to note an abnormally high count on a specific mandrel, attempt to correct the problem, reset the counts and then check the counts at a latter time to determine if the problem is corrected. This data is viewed on the HSM-DC8 display.

SECTION 1
GENERAL DESCRIPTION

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SECTION 2
INSTALLATION

The HSM-DC8 module is provided for door mounting on the existing user's control cabinet door or console.

2.1 WHAT'S INCLUDED

Verify that the following items are included when unpacking the HSM-DC8:

1ea. HSM-DC8 M4503 Module with required I/O boards
1ea. HSM-DC8 User's Manual
1ea. HSM-DC8 Keypad Quick Reference
1ea. M4500 User's Manual
1ea. HSM-DC8 Program Disk

The following items are optional items and can be purchased separately as required or desired:

1ea. HSL-QCSTA Remote Select-A-Can PB station
1ea. HSL-DSP Remote RPM/Position Display
1ea. RSV34-MS1 Resolver
1ea. RSV-RSCBLE-XX Resolver Cable

2.2 POWER REQUIRED

The HSM-DC8 is powered from 115VAC/230VAC 50/60HZ and +24VDC. The 115VAC/230VAC is used to power the HSM-DC8 module while the +24VDC is used to power the +24VDC I/O (sensors, trip and blow-off solenoids). Note that +24VDC solenoids must be used for all trip and blow-off solenoids. These provide a much more consistent and repeatable response time than 115VAC solenoids. Assuming +24VDC solenoids were used in the existing system, the +24VDC current required by the HSM-DC8 is no more than the existing systems +24VDC current requirement, therefore the existing +24VDC power supply should be adequate.

2.3 MOUNTING THE HSM-DC8

The HSM-DC8 module should be mounted in the door of the existing user's cabinet or console door. Perform the following steps to mount the HSM-DC8 module:

1) Referring to the recommended cut-out in figure 1, cut a cut-out in the door of the existing user's control cabinet or console.

2) Remove all the field wiring connectors from the top of the HSM-DC8 module. With the gasket installed on the HSM-DC8 module mounting studs, slide the HSM-DC8 module into the cut-out from the front. Attach the HSM-DC8 module to the door using the supplied hardware.

3) Once the module is installed, a lugged earth ground wire should be installed on one of the module mounting screws to insure that the HSM-DC8 is well grounded.

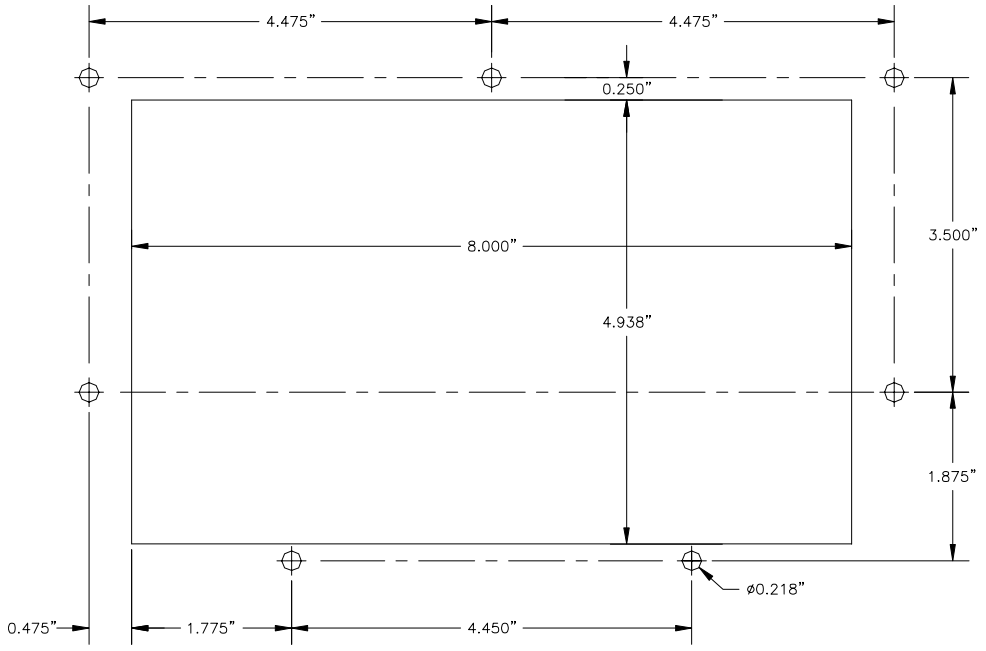

Figure 1
Recommended Panel Door Cut-out

2.4 WIRING THE HSM-DC8

Referring to the electrical control schematic at the back of this manual, wire the HSM-DC8 as follows:

Note: The HSM-DC8 contains removable field wiring connectors for ease of maintenance. It is generally easier to perform the wiring described below with the connectors removed from the module and then installing the connectors to the module once all wiring is complete.

1) Incoming Power (115VAC-230VAC to L, N, and G of HSM-DC8 power connector and +24VDC to I/O connectors).

2) Interlocks from existing control system to HSM-DC8 (inputs B100.2 - B100.7).

3) Interlocks to existing control system from HSM-DC8 (outputs B110.7 - B111.7).

4) Odd Trip Cam, Even Trip Cam, Pin Chain Blow-off, Q.C. Select-A-Can Blow-off and Can Feed solenoids.

5) Can/No Can Sensor, Mandrel No.1 Mark Sensor, and Can on Mandrel Sensor using three conductor shielded cables. The shields of the sensor cables should be tied to earth ground at a terminal inside the existing control cabinet and left floating at the sensors.

6) Set-Up Enable (passcode by-pass) key switch (if desired).

7) Resolver cable from resolver or existing PLS to RO-S4 connector on HSM-DC8 using a three pair, two conductor shielded cable. The shield of the resolver cable should be tied to the "SHLD" terminal of the HSM-DC8 resolver input connector. Make sure the resolver cable shield is left floating at the resolver.

In general, when wiring the HSM-DC8, keep all +24VDC wiring, resolver cable, and sensor cable wiring away from high voltage wiring.

2.5 MOUNTING THE HSL-QCSTA (optional)

The HSL-QCSTA is used to blow-off a can from a selected spindle (or blanket) from the pin chain for quality verification. If the optional HSL-QCSTA remote select-a-can PB station was purchased, mount it in the vicinity of the pin chain QC blow-off port in a convenient location for the operator. Wire the HSL-QCSTA to the HSM-DC8 module referring to the electrical control schematic at the back of this manual.

2.6 MOUNTING THE RSV34-MS1 RESOLVER (if required)

The HSM-DC8 is designed to interface to a resolver (not encoder) for machine timing. If the machine is not already equipped with a resolver, then the existing encoder will have to be removed and an RSV34-MS1 resolver will have to be mounted in it's place. If this is the case, refer to the RSV34-MS1 data sheet for details on mounting the resolver.

Note: The resolver must make 1/2 revolution for each spindle (12 revolutions per spindle wheel revolution). Use the RSV-RSCBLE cable to connect the resolver to the HSM-DC8. Route the resolver cable in a separate conduit, away from all other high voltage and control wiring. Wire the cable directly to the 8-pin resolver connector on the HSM-DC8 (see section 2.4).

2.7 MOUNTING THE MANDREL #1 MARK SENSOR (not provided)

If the machine is not already provided with a spindle #1 I.D. sensor, then one will have to be mounted. This sensor is used to determine which spindle is the #1 spindle for both the QC select-a-can blow-off and the trips per spindle count. This must see a target once every revolution of the spindle wheel (once every 24 spindles). Any non-discriminating 10-30VDC proximity sensor can be used and it can be mounted anywhere around the periphery of the spindle wheel. The target it looks at should be either a large steel bolt head or 1" by 1" square steel target mounted on the spindle wheel in the vicinity of spindle #1.

2.8 HSM-DC8 SOFTWARE INSTALLATION

Follow the steps below to install the HSM-DC8 Set-up software package and the HSM-DC8 application programs onto the IBM PC or compatible which will be used to support the HSM-DC8 package.

The HSM-DC8 set-up software is used to download the program to the HSM-DC8 module, tune (set-up) the user adjustable variables of the HSM-DC8, download and upload (save) the user set-up variables to disk, and view trips per spindle and shift data on the IBM PC used to support the HSM-DC8. To install the set-up software, perform the following steps:

1) Create one directory off the root directory of the PC for each decorator the HSM-DC8 will be used on called "HSMDEC1" for the line 1 decorator, "HSMDEC2" for the line 2 decorator, "HSMDEC3" for the line 3 decorator, etc. These will be used to store the "HSMCD8.EXE" setup programs and HSMDC8 set-up data for each decorator. Create these directories by typing the following at the DOS prompt:

   MD \HSMDEC1<ENTER>
   MD \HSMDEC2<ENTER>
   MD \HSMDEC3<ENTER>

2) Install the disk labeled "HSM-DC8 PROGRAMS" into the A: drive. For each "HSMDEC" directory you created in the previous step, switch to that directory and install the "HSM-DC8" set-up programs by typing the following at the DOS prompt (Line 1 decorator is shown):

   CD \HSMDEC1<ENTER>
   A:INSTALL<ENTER>

3) Add each decorator's HSM-DC8 set-up program to your computer's menu software by creating a selection for each decorator called "SET-UP DECO LINE1" for the line #1 decorator, "SET-UP DECO LINE2" for the line #2 decorator, etc.. The DOS commands executed for these selections should be:

   For the "SET-UP DECO LINE1" selection:

```
CD  \HSMDEC1
HSMDC8  HSMDC8
CD  \
```

   For the "SET-UP DECO LINE2" selection:

```
CD  \HSMDEC2
HSMDC8  HSMDC8
CD  \
```

   etc.

4) To execute the respective decorator's set-up program, simply select the corresponding "SET-UP DECO LINE" selection from the menu software's menu.

2.9 SYSdev PROGRAM DEVELOPMENT SOFTWARE INSTALLATION

The SYSdev Program Development software is used to perform on-line trouble-shooting and program modifications to the HSM-DC8. If SYSdev was purchased with the HSM-DC8 package and is not already installed on the your computer, install SYSdev onto the hard drive of your computer following the steps in section 1.5 of the SYSdev Program Development manual.

2.10 HSM-DC8 APPLICATION PROGRAM INSTALLATION

The HSMDC8 application program is a SYSdev based program which is loaded into the HSM-DC8 module and performs the HSM-DC8 logic. The HSMDC8 program is written in a combination of Ladder logic and High-level. If the user desires to make program changes or perform on-line monitoring of the program execution, the files which constitute the HSMDC8 program will have to be loaded onto the hard drive of the PC which is used to support the HSM-DC8. The SYSdev Program Development Software will also have to be loaded on the PC (see section 2.10). To install this program perform the following:

1) If not already done, perform steps 1 through 3 of section 2.8. This creates the directories and menu selections which will be used to store and select the HSMDC8 application programs.

2) Install the disk labeled "HSM-DC8 PROGRAMS" into the A: drive. For each of the "HSMDEC" directories, switch to that directory and install the HSMDC8 application program by typing the following at the DOS prompt (Line 1 decorator is shown):

   CD \HSMDEC1<ENTER>
   COPY A:HSMDC8.*<ENTER>
   CD \

3) Add the HSMDC8 application programs to your computer's menu software by creating selections called "HSM-DC8 PROGRAM LINE1", etc. for each decorator. The DOS commands executed for these selections should be (Line 1 decorator shown):

   CD \
   SYSDEV \HSMDEC1 HSMDC8

4) To initiate SYSdev with the "HSMDC8" program, simply select the respective "HSM-DC8 PROGRAM" selection from the menu software's menu. The main development menu of SYSdev will be initiated with the HSMDC8 program. See the SYSdev Program Development manual and the M4500 Program Development manual for complete details on on-line monitoring and program development with SYSdev.

2.11 MODIFY EXISTING PLC PROGRAM

Modify the existing control system PLC program to interface with the HSM-DC8 by incorporating the following into the existing PLC ladder logic:

1) The HSM-DC8 now controls the odd trip cam, even trip cam, and pin chain blow-off. If the existing host PLC was previously controlling these functions, it no longer will be with the addition of the HSM-DC8. This logic can optionally be removed from the existing host PLC if desired. In most cases this logic can be left in the program as connecting the respective solenoids to the HSM-DC8 will effectively defeat the logic.

2) The “End of Shift” and either be an output from the PLC or from a push button. When the “End of Shift” input goes “ON” the current shift data will be transferred to the last shift and all data registers for the current shift, as well as the trips per spindle, will be reset to zero.

3) Add the "Can Feed Enable" output to the PLC logic. When turned "on” while running, the infeed is timed "open" with the can feed timing signal. When turned "off" while running, the infeed is timed "closed" with the can feed timing signal. When the machine is stopped, turning this input "on" and "off" will respectively "open" and "close" the can stop.

4) Add the "Main Drive On" output to the PLC logic. This should be "on" when the drive is enabled (running) and should be "off" when the drive is disabled (this includes auto stop conditions). This is true for jog modes as well.

5) Add the "Alarm Reset" output. This signal should be "on" as long as the system reset push-button is depressed.

6) Add the "Pin Chain Manual Blow-off" output to the PLC logic. This can be used as a manual blow-off. When "on", the bad can pin chain blow-off is "on". When "off", the pin chain blow-off functions normally, blowing off detected bad cans, restart cans, etc.

7) Add the "PLC Clock", timing channel CH06, input to the PLC logic. This is a general purpose PLC clock timing signal, pulsed once per can, initially set at 0° - 90°, 180° - 270°.

8) Add the "Blow-off Data Clock", timing channel CH07, input to the PLC logic. This is used to clock the blow-off data bits (blowoff 0, blowoff 1 and blowoff 2). Use the leading edge of this signal to increment the PLC blow-off data counters. The blow-off data is encoded into a 3-bit binary code according to the following chart.

	BLOWOFF 2	BLOWOFF 1	BLOWOFF 0
None	0	0	0
Restart Blow-off	0	0	1
Q.C. Blow-off	0	1	0
Manual Blow-off	0	1	1
Bad Can Blow-off	1	0	0
Good Can	1	0	1

9) Add the "Canfeed Enable Speed" into the PLC logic. The canfeed enable speed comes "ON" whenever the speed of the machine is within the canfeed enable window. Use this signal to control the canfeed enable whenever this signal is "ON".

10) The "10 Pulses per Can Pulse Train" is intended to be used in conjunction with the cyclic ductors cycling control.

11) The HSM-DC8 detects the following alarms:
- Timing Signal Fail.
- No Can Transfer.
- Infeed Track Jam.

These alarms are available to the host PLC via the discrete encoded alarm bits according to the following chart.

	ALARM BIT 1	ALARM BIT 0
Timing Signal Fail	0	1
No Can Transfer	1	0
Infeed Track Jam	1	1

2.12 TUNING THE HSM-DC8

The HSM-DC8 is shipped from the factory with the PLC program "HSMDC8" loaded in the PLC section of the HSM-DC8 and the PLS channel set-point file "DC8TMG" loaded in the PLS section. These are the standard programs used to implement the standard HSM-DC8 decorator or basecoater algorithms. In most cases, the following user variables and timing signals may have to be altered to tune the HSM-DC8 to the actual decorator it is controlling.

Once the HSM-DC8 is installed and the control system is powered back up, perform the following to set-up and tune the HSM-DC8. The set-up is performed using either the Display/Keypad of the HSM-DC8 or an IBM PC or compatible running the "HSMDC8" set-up program.

See the HSM-DC8 Keypad Quick Reference for exact key depress sequences for entering the following parameters. See section 3 of this manual for a description of the Keypad commands and menu displays of the HSM-DC8 Display/Keypad. See section 4 for a description of the "HSMDC8" menus and variables and how to use the "HSMDC8" set-up program.

2.12.1 DEFAULT SETUP VARIABLES

As shipped, the user variables for the HSM-DC8 are set the following defaults:

Speed Parameters:

Canfeed Enable - Low Speed _____: 000
Canfeed Enable - High Speed _____: 000
O'Varnish Roll Speed Calibrate _____: 000

Bad Can (pin chain) Blowoff:

Blowoff solenoid "on" response time (msec) _____: 015
Blowoff solenoid "off" response time (msec) _____: 028
# of bad cans to blowoff for misload _____: 001
# of cans to blowoff from infeed open _____: 007
# of cans to blowoff from print at restart _____: 004
# of cans to blowoff from varnish at restart _____: 004
# of pins to pin chain blowoff port _____: 050

QC Can (select-a-can) Blowoff:

Blowoff solenoid "on" response time (msec) _____: 015
Blowoff solenoid "off" response time (msec) _____: 028
QC can blowoff port shift offset _____: 001

Spindle Trip Offset _____: 000

The "DC8TMG" timing channel file, as shipped, contains the following default timing set-points:

CHAN	ON	- OFF	DESCRIPTION
CH00:	000	- 020	Odd Trip Cam
CH01:	180	- 200	Even Trip Cam
CH02:	160	- 180	Cam Reset
	340	- 000	
CH03:	040	- 060	Can Feed
	220	- 240	
CH04:	050	- 070	Bad Can Blow-off
	230	- 250	
CH05:	055	- 075	Q.C. Can Blow-off
	235	- 255	
CH06:	000	- 090	PLC Clock
	180	- 270	
CH07:	050	- 140	Blow-off Data Clock
	230	- 320	

2.12.2 SET MACHINE ZERO

Position the machine at machine zero and set the HSM-DC8 offset per section 3.5.4 (HSM-DC8 keypad) or section 4.3.1 ("HSMDC8" set-up program).

2.12.3 VERIFY LOCATION OF CAN/NO CAN SENSOR

Verify the location of the Can/No Can sensor by placing a can on a spindle and slowly jogging the machine until the Can/No Can sensor sees the can. The sensor should first see the can at between 90 and 130 degrees. If it does, the location of the sensor is correct. (See the electrical timing procedure drawing at the back of this manual)

2.12.4 SET PIN CHAIN BLOW-OFF TIMING

Using the HSM-DC8 keypad or the "HSMDC8" set-up program, set the bad can (pin chain) blowoff timing (CH05) such that the timing signal just turns "on" when the chain blowoff port is centered between pins on the chain (see figure 4 of the electrical timing procedure drawing at the back of this manual). The signal should be 40 degrees wide.

2.12.5 SET # OF PINS TO PIN CHAIN BLOW-OFF PORT

Using the HSM-DC8 keypad or the "HSMDC8" set-up program, set the "# of pins to pin chain blowoff port" by counting the number of pins from the spindle wheel to disc transfer location to the bad can pin chain blowoff port. The number entered is the number counted minus 2 (this is still just an approximation).

Set the “# of bad cans to blow-off for each misload” equal to one. Run the machine at low speed with cans and verify that for each misload, the one bad can is blown off. If the bad can is not blown off then adjust the “# of pins to pin chain blow-off port” accordingly until the misloaded can is blown off.

Note: On this system, only one can will normally be blown off for each misload on a particular mandrel. However, the end user may select to blow-off up to five cans to get rid of the excess ink on a particular blanket.

Note: The chain take-up must be after the bad can pin chain blow-off. If the take-up is before the port, the relative position of the port to the blow-off timing will vary as the take-up moves, causing partial blow-offs to occur.

2.12.6 SET # OF CANS TO BLOW-OFF AT RESTART

Using the HSM-DC8 keypad or the "HSMDC8" set-up program, set the "# of cans to blowoff from infeed open", the "# of cans to blowoff from print at restart", and the "# of cans to blowoff from varnish at restart" as desired.

2.12.7 SET Q.C. BLOW-OFF SHIFT OFFSET

Using the HSM-DC8 keypad or the "HSMDC8" set-up program, set the "QC can blowoff port shift offset" as follows: dial in spindle #1 on the select-a-can thumb wheel switch and, with the machine running slowly, mark cans printed on spindle #1 so they can be identified while they are on the chain. Press the select-a-can push-button and observe the can that was actually blown off with the location of a can printed on spindle #1. Add the number of cans difference between the can actually blown off and the can printed on spindle number one to the "QC can blowoff port shift offset".

Note: This variable must be a number between 1 and 24 as there is always a can printed on spindle #1 every 24 cans. Once set-up, verify that a can from spindle #1 is blown off when 1 is dialed in on the thumb wheel and the select-a-can push-button is pressed.

2.12.8 SET SPINDLE TRIP SHIFT OFFSET

Using the HSM-DC8 keypad or the "HSMDC8" set-up program, set the "Spindle trip shift offset" as follows: Initially set the "Spindle trip offset" to zero. Now wrap a piece of tape around spindle #1 such that cans will not load on this spindle. With the machine running very slowly with the can gate open, verify that indeed cans do not load on spindle #1 and that the print carriage is tripped for that spindle.

Observe the trips per spindle data and determine which spindle number is being incremented every time the carriage trips. The spindle number that should be incrementing is spindle #1. If it is not, subtract 1 from the spindle number that is being incremented and enter this value as the spindle trip offset. Note that this variable must be a number between 0 and 23. Now verify that the spindle #1 count is incremented every time the carriage trips for spindle #1. If it still increments another spindle number other than #1, continue adjusting the "spindle trip offset" until it does. Stop the machine and remove the tape from spindle #1.

2.12.9 SET CANFEED ENABLE SPEED

Using the HSM-DC8 keypad or the “HSMDC8” set-up program, set the “Canfeed Enable Low Speed” and “Canfeed enable High Speed”. These two settings are used in conjunction with one another to define a window within which the can gate can be opened or closed. This allows the flow of cans to be controlled whenever the machine speed is inside this window. This window should be set for optimal loading conditions.

2.12.10 SET O'VARNISH ROLL SPEED CALIBRATE

Using the HSM-DC8 keypad or the "HSMDC8" set-up program, set the "O'Varnish Roll Speed Calibrate". The O'Varnish drive speed input is a 0-10VDC signal from the O'Varnish drive (if available). The roll speed calibrate is used to scale this signal to display the "O'Varnish RPM". The number entered here should equal the O'Varnish roll speed when the drive is at full speed (input = 10VDC).

The machine is now set-up and ready to run.

2.13 HSM-DC8 MODULE REPLACEMENT

The following is provided only as a reference. These steps need only be performed in the event the HSM-DC8 module needs to be replaced once installed. To replace the module, perform the following:

1) Turn both 115VAC and +24VDC power to the module "off" and remove all the field wiring connectors from the module.

2) Remove the 8-32 nuts and lock washers (7ea.) which retain the module in the door and remove the module.

3) Remove the supplied field wiring connectors from the new module and install the new module in the door cut-out from the front and re-install the 8-32 nuts and lock washers (7ea).

4) Install the existing pre-wired field wiring connectors on all the I/O boards of the module (115VAC power connector, I/O slots0 and 1, resolver connector, and IN0/IN1 connector). Make sure all the field wiring connectors are fully mated in the module.

5) Apply 115VAC and +24VDC power to the module and verify that the "PWR" and "RUN" LEDs on the module are "on" and the "FLT" LED is "off".

6) Connect an RS-232 cable from the computer COM port to the "PROG" port on the HSM-DC8.

7) From the computer's menu program, select the respective decorator's "SET-UP DECO" selection (this was set in section 2.9). The "HSMDC8" set-up program will be invoked with the corresponding HSMDC8 application program for that decorator.

8) Download the PLS timing set-points to the module by selecting "3: Machine Timing" from the HSM-DC8 main menu. From the PLS main development menu, select "4: Download Channels to PLS". Press the <ENTER> key to start the download. Press any key to return back to the PLS main development menu. Press 12<ENTER> to return back the HSM-DC8 main menu.

9) Download the previously saved to disk set-up data to the module by selecting "8: Download Set-up data to Module" from the HSM-DC8 main menu. Press the <ENTER> key to start the download. Once the download is complete, press any key to return to the HSM-DC8 main menu. See section 4.1 for complete details.

10) The HSM-DC8 is now ready to run, loaded with the HSMDC8 timing set-points, and set-up data that was previously saved for the respective decorator. Press <ESC> to return back to the computer's menu software program.

SECTION 3
USING THE HSM-DC8 KEYPAD/DISPLAY

The keypad of the HSM-DC8 contains 24 keys consisting of data display commands, set-up commands, and a numeric keypad. The display of the HSM-DC8 is 2 line by 40 character back-lit LCD display which displays the selected data and set-up menus. The keypad/display can be used by the operator to view data or activate the select-a-can QC blow-off and can be used by authorized personnel to adjust the timing and all set-up parameters (passcode or key switch protected).

The display/keypad allows the following to be viewed or adjusted:

1) Set Speed Parameters
2) Set Pin Chain/QC Blow-off Parameters
3) Set Machine Timing
4) Set Machine Zero
5) View the Number of Trips per Spindle
6) View the Current Shift Data
7) View the Last Shift Data
8) Activate the select-a-can QC blow-off

The definitions of the keypad commands and menus are described in the following sections. Note for virtually all the menus, the "NEXT" and "PREV" keys can be used to advance to the next item of the menu or retard to the previous item on the menu.

3.1 DEFAULT SCREEN

The default screen (displayed when no other commands are active) contains the following data:

```
MACHINE CPM:0000     O'VARNISH RPM:000
GOOD CANS:0            BLOWOFFS:0
```

Where the “Machine Speed” is the current speed of the decorator, “O’Varnish RPM” is the current speed of the varnish unit, the “Good Cans” field is the total number of good cans printed so far into the current shift, and the “Blow-offs” field is the total number of cans blown-off the machine (scrap) so far into the current shift. This display effectively replaces a speed meter, and two can counters. This screen is always returned to when no commands are active.

3.2 "TRIPS PER SPINDLE" KEY

The Number of trips per spindle menu is provided to aid in the trouble-shooting of a loading problem with a spindle or spindles. The total number of trips for each spindle since the last reset or end of shift is displayed. The operator can reset these counts at any time to aid in the trouble-shooting process. The data can be viewed simply by pressing this key. The display shows a series of screens each with four spindles from 1 through 24 as shown below:

```
-- TRIPS (MIS-LOADS) PER SPINDLE --
  1:xxxx    2:xxxx    3:xxxx    4:xxxx
```

Where the numbers 1 through 4 are the first 4 spindles and the "xxxx" would be the actual counts for the respective spindles. Screens for spindles 5 thru 8, 9 thru 12, etc. are shown in this fashion each for a time delay of 10 seconds. In addition, the user can advance to the next screen or retard to the previous screen by pressing the "NEXT" or "PREV" key respectively.

The final screen of this menu, prompts the user to reset the counts by pressing "0" or not to by pressing "ESC". This provides the operator with the opportunity to reset the counts if desired for trouble-shooting. If the counts are to be reset, press the "0" key, if not, press the "ESC" key. The default screen will now be displayed again.

The "ESC" key can also be used at any time to abort the trips per spindle data display and return back to the default screen.

3.3 "CURRENT SHIFT" KEY

The "Current Shift" key is used to view the current shift data. This data is the totals so far into the shift. The data is transferred to the "Last shift" data when the end of shift input transfers from a "0" to a "1". This can be at the end of either an 8 or 12 hour shift or alternatively could be done at label changes such the data collected would be for label runs rather than complete shifts. This data cannot be reset by the operator, only at the end of shift input transition. Note that the Current shift "Good Cans" and "Blow-offs" is displayed as part of the default screen (see section 3.1).
The Current Shift data is defined as follows:

Good Cans: This is the total number of good cans printed so far into the shift. This is essentially a can counter.

Blow-offs: This is the total number of cans blown-off the machine. This includes all types of blow-offs: the three cans blown-off for every mis-loaded can, infeed open blow-offs, restart blow-offs, manual blow-offs, select-a-can QC blow-offs, etc.

Mis-loads: This is the total number of mis-loaded cans (trips). These would be the actual number of damaged cans that did not load properly on the machine. This gives an indication of conveying/can handling problems.

Restart Blow-offs: This is the total number of cans blown off when the infeed opened and from the print station and varnish station at machine restart.

Manual Blow-offs: This is the total number of cans blown-off by the operator using the Manual Blow-off PB or selector switch.

QC Blow-offs: This is the total number of cans blown-off by the operator with the Select-A-Can QC station or QC Blow-off key on the HSM-DC8 keypad for quality verification.

Trips (Mis-loads) per Spindle (1:-24:): This is the total trips (mis-loads) for each spindle. A disproportionately high count for a particular spindle indicates a loading problem for that spindle.

3.4 “LAST SHIFT” KEY

The "Last Shift" data is identical to the current shift data except it is for the previous 8 or 12 hour shift or previous label run, however the shift collection is set-up. This allows data collection and diagnostics to take place automatically over a two shift period. Refer to section 3.3 for definitions of the data fields in the "Last Shift" data menu.

3.5 "SET-UP" KEY

This selection is used to invoke the primary set-up menu. This consists of the following four selections:

1: SET SPEED PARAMETERS
2: SET PIN CHAIN/QC BLOW-OFF PARAMETERS
3: SET MACHINE TIMING (SET-POINTS, ETC.)
4: ZERO MACHINE (SET RESOLVER OFFSET)

When selected, each of the above selections bring up a sub-menu with the corresponding set-up parameters. The following sections describe these sub-menus and the definitions of the corresponding variables. To select the respective set-up sub-menu, simply press the corresponding numeric key (1 thru 4).

Note that the primary set-up menu is passcode protected. When the set-up key is first depressed, an "ENTER PASSCODE:" prompt is displayed. At this point, the 5-digit passcode must be entered followed by pressing the <ENTER> key. If the passcode entered is correct, the primary set-up menu is then displayed and any of the parameters accessed by this menu may be changed. If the passcode entered is incorrect, the message "INCORRECT PASSCODE" will be displayed. At this time the passcode may be entered again or the <ESC> key can be pressed to return back to the main menu.

When the passcode is entered, the digits entered are not displayed. Instead "*" characters are displayed as each digit is entered. This prevents unauthorized personnel from observing the passcode as it is entered. In addition, the "ENTER PASSCODE" prompt is only displayed for a maximum of 60 seconds. The correct passcode must be entered within this 60 second period otherwise the set-up mode is aborted and the main menu is re-displayed.

Refer to section 3.7 (Set Keypad/Display "Set-up" passcode) for details on setting the passcode as desired.

For user's that would prefer to use a keyed switch to prevent unauthorized access instead of a passcode, the "Set-Up Enable" input can be used. When this input is "on", the passcode prompt is bypassed and access to the primary set-up menu is provided immediately. If the "Set-Up Enable" input is "off", then the normal passcode prompt is displayed. A keyed switch can then be wired to the "Set-Up Enable" input such that when the switch is in the enable position, the input is "on".

3.5.1 SET SPEED PARAMETERS

This menu is activated when the "1" key (SET SPEED PARAMETERS) is pressed while the primary set-up menu is active. The following four set-up parameters may then be adjusted or viewed:

Canfeed Enable Speed: The “Canfeed Enable Low Speed” and “Canfeed Enable High Speed” are used in conjunction with one another to define a window within which the can gate can be opened or closed. This allows the flow of cans to be controlled whenever the machine speed is inside this window. This window should be set for optimal loading conditions.

O’Varnish Roll Speed Calibrate: The O’Varnish drive speed input is a 0-10VDC signal from the O’Varnish drive (if available). The roll speed calibrate is used to scale this signal to display the “O’Varnish RPM”. The number entered here should equal the O’Varnish roll speed when the drive is at full speed (input = 10VDC).

The "NEXT" and "PREV" keys can be used to advance to the next or previous parameter respectively. To change the currently displayed parameter, simply enter the new value on the numeric keypad and press <ENTER>. The value will be entered and the next parameter will automatically be displayed. When the last parameter (O’Varnish Roll Speed Calibrate) is entered, the primary set-up menu is again displayed. Pressing <ESC> at anytime will also exit you back to the primary set-up menu.

3.5.2 SET PIN CHAIN/QC BLOW-OFF PARAMETERS

This menu is activated when the "2" key (SET PIN CHAIN / QC BLOW-OFF PARAMETERS) is pressed while the primary set-up menu is active. The following blow-off set-up parameters may then be adjusted or viewed:

 # Cans to Blow-off at Infeed Open: This is the number of cans which will be blown off when the infeed is first opened. Valid range: 0 to 99.

 # Cans to Blow-off from Print at Restart: This is the number of cans which will be blown off from the print station when the machine is restarted. Valid range: 0 to 99.

 # Cans to Blow-off from Varnish at Restart: This is the number of cans which will be blown off from the varnish station when the machine is restarted. Valid range: 0 to 99.

 # Cans to Blow-off for each Misload: This is the number of cans blown off at the pin chain port when a mis-loaded can is detected (typically set at 1 can). Any additional cans entered, will be blown off every 12^{th} can later (cans that would be have been printed on the same blanket.

 # Pins to Pin Chain Blow-off Port: This is the number of pins from the spindle wheel to disk transfer location to the first can blown off at the Pin Chain blow-off port minus two. This can be a number from 0 to 999.

Pin Chain (bad can) Solenoid "on" Response Time (msec): This is the time used as the "on" response time of the pin chain blow-off port (time from "on" solenoid actuation to first air out port) in milliseconds. The HSM-DC8 will activate the solenoid this amount of time ahead of the Pin Chain blow-off timing (CH04) (usually set at 15 to 20 milliseconds). Valid range: 5 to 60 msec.

Pin Chain (bad can) Solenoid "off" Response Time (msec): This is the time used as the "off" response time of the pin chain blow-off port (time from "off" solenoid actuation to air stopping at port) in milliseconds. The HSM-DC8 will activate the solenoid this amount of time ahead of the Pin Chain blow-off timing (CH04) (usually set at 15 to 20 milliseconds for double acting solenoids and set at 25 to 30 milliseconds for single acting solenoids). Valid range: 5 to 60 msec.

QC Blow-off Solenoid "on" Response Time (msec): This is the time used as the "on" response time of the QC blow-off port (time from "on" solenoid actuation to first air out port) in milliseconds. The HSM-DC8 will activate the solenoid this amount of time ahead of the QC blow-off timing (CH05) (usually set at 15 to 20 milliseconds). Valid range: 5 to 60 msec.

QC Blow-off Solenoid "off" Response Time (msec): This is the time used as the "off" response time of the QC blow-off port (time from "off" solenoid actuation to air stopping at port) in milliseconds. The HSM-DC8 will activate the solenoid this amount of time ahead of the QC blow-off timing (CH05) (usually set at 15 to 20 milliseconds for double acting solenoids and set at 25 to 30 milliseconds for single acting solenoids). Valid range: 5 to 60 msec.

QC Blow-off Shift Offset: This is the number of spindles difference from detection of the spindle #1 flag to the QC blow-off port. This is a number between 1 and 24 and is empirically set by selecting spindle #1 for blow-off and adjusting this value until the can from spindle #1 is the can that is blown off.

Spindle Trip Shift Offset: This is the number of spindle difference from the detection of the spindle #1 flag to the Can/No Can sensor. This is a number between 0 and 23 and is empirically such that a mis-loaded can on spindle #1 increments the spindle #1 count in the "Trips per spindle" menu (see section 2.12.8).

The "NEXT" and "PREV" keys can be used to advance to the next parameter or the previous parameter respectively. To change the currently displayed parameter, simply enter the new value on the numeric keypad and press <ENTER>. The value will be entered and the next parameter will automatically be displayed. When the last parameter (Spindle trip shift offset) is entered , the primary set-up menu is again displayed. Pressing <ESC> at anytime will also exit you back to the primary set-up menu.

3.5.3 SET MACHINE TIMING (SET-POINTS, ETC.)

This selection brings up the timing set-point menu which displays the following fields:

```
Chuu SETPOINT:xxx    []  "channel name"
 RPM:yyyyOFFSET:www        SCALE:360
```

Each field is defined as follows:

Field	Definition
Chuu	Currently selected channel (CH00 thru CH07) where "uu" is the octal channel number.
SETPOINT:xxx	Channel "on" or "off" set-point where "xxx" is the set-point position
[]	State of channel set-point (blank = "off", solid block character = "on")
"channel name"	selected channel name: (CH00) ODD TRIP CAM, (CH01) EVEN TRIP CAM, etc.
RPM:yyyy	Current machine speed where "yyyy" is in CPM.
POS:zzz	Current resolver position where "zzz" is in degrees.
OFFSET:wwww	Resolver offset where "wwww" is the offset in degrees.
SCALE:360	Resolver SCALE FACTOR (360 degrees per revolution).

In addition to displaying the timing set-point menu, the following keys are also enabled: "ENTER SET-POINT", "CLEAR CHANNEL", "SELECT CHANNEL", and "SEARCH CHANNEL".

The "ENTER SET-POINT" key is used to enter a new set-point (both "on" and "off" set-points) in the selected channel. The "CLEAR CHANNEL" key is used to clear all set-points from the selected channel. The "SELECT CHANNEL" key is used to select a new channel for programming. The "SEARCH CHANNEL" is used to view both the "on" and "off" set-points in the selected channel.

Searching Channel: To view the set-points in a channel simply press the "SEARCH CHANNEL" key. The next "off" to "on" or "on" to "off" position is shown in the "SETPOINT" field. If the transition was "off" to "on", the state character [] will be a solid block. If the transition was "on" to "off", the state character [] will be blank.

Entering or Adjusting Set-point: To set or adjust a timing channel, perform the following:

1) Select the channel to be adjusted by pressing the "SELECT CHANNEL" key, entering the channel number (00 to 17) and pressing <ENTER>. In addition, the "NEXT" and "PREV" keys can be used to advance to the next channel or retard to the previous channel.

2) Press "CLEAR CHANNEL" to clear the existing set-point out.

   NOTE: entering a new set-point does not automatically clear the old set-point out. If the two set-points are not in the same place, the channel will simply have two set-points in it if the old one is not cleared out first. Therefore always clear the channel before entering a new set-point. A set-point may, however, be "extended" by programming another set-point onto an existing set-point using either the existing "on" or "off" set-point as the starting position for the new set-point. This will result in one larger set-point.

3) Press "ENTER SET-POINT" to enter the new set-point. The display will then prompt ""ON" SETPOINT:". Enter the position (in degrees) where the set-point should go "on" and press <ENTER>. The display will now prompt ""OFF" SETPOINT:". Enter the position (in degrees) where the set-point should go "off" and press <ENTER>. The channel will now be programmed with a set-point that goes "on" at the "on" position entered and "off" at the "off" position entered.

4) Exit back to the primary set-up menu by pressing <ESC>. Exit back to the default screen by pressing <ESC> again.

3.5.4 ZERO MACHINE (SET RESOLVER OFFSET)

This selection is used to auto zero the resolver. To set the machine zero (resolver offset) perform the following:

1) Select "3: SET MACHINE TIMING" and observe the "POS:" field. Verify that as the machine is rotated forward (either jogged or barred) that the position increases linearly from 0 through 359. If not, swap the S1 and S3 leads of the resolver at the HSM-DC8 resolver connector. Then verify that the position then indeed does increase with forward movement. Press <ESC> to exit back to the primary set-up menu.

2) Position the machine at machine zero (odd trip cam follower just past odd trip cam, see the electrical timing procedure drawing, figure 3 at the back of this manual).

3) Auto zero the resolver by selecting "4: ZERO MACHINE" from the primary set-up menu. Enter "0" to zero the resolver. The timing set-up menu will be displayed, now showing the "POS:" at zero.

4) The HSM-DC8 will calculate the actual offset value required to make this the 000 position and will display this number in the offset field.

5) Exit back to the primary set-up menu by pressing <ESC>. Exit back to the default screen by pressing <ESC> again.

3.6 "QC BLOW-OFF" KEY

This key is used to blow-off a can from a selected spindle at the Pin Chain QC Blow-off port. To blow-off a can, press the "QC BLOW-OFF" key. The display will then prompt "Enter Spindle to Blow Can off:". Enter the desired spindle number (1-24) and press enter. One can from that spindle will be blown off at the Pin Chain QC blow-off port.

3.7 SET KEYPAD/DISPLAY "SET-UP" KEY PASSCODE

The "Set Passcode" input to the HSM-DC8 is used to actually set or view the passcode of the set-up menu. Normally this input should be "off". When the passcode is to be set, jumper this input to +24VDC and press the "Set-Up" key. The "ENTER PASSCODE" prompt will be displayed and the current 5-digit passcode will be displayed with the prompt. This allows the passcode to be viewed if necessary.

If the passcode is to be changed, enter any number between 0 and 64999 and press <ENTER>. Note that if passcode protection is not to be used, set the passcode to "0". Then when the passcode is prompted for after the "Set-up" key is pressed, simply press <ENTER> to proceed to the set-up menu. If the passcode protection is to be used, set the passcode to a number between 1 and 64999. Then when the "Set-up" key is pressed, the actual valid passcode number will have to be entered in order to gain access to the set-up menu.

Once the passcode is set, turn the "Set Passcode" input back "off" and now the set-up menu will be passcode protected with the number you have entered as the passcode.

SECTION 3
USING THE HSM-DC8 KEYPAD/DISPLAY

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SECTION 4
"HSM-DC8" SET-UP PROGRAM REFERENCE

The "HSMDC8" set-up program is a DOS based menu driven program which allows the user to easily view the HSM-DC8 data or alter the HSM-DC8 set-up variables using an IBM PC or compatible. In addition to setting the set-up variables, "HSMDC8" can be used to set the machine timing (machine offset, timing signal locations, etc.). The set-up variables are used to configure and tune the HSM-DC8 to match the configuration and performance of the specific decorator (see section 2.12).

Note: The "HSMDC8" program is an on-line communications program used to interface with the HSM-DC8 module. The data displayed in the menus and set in the menus is communicated directly to the module. Therefore, prior to selecting any of the above selections, make sure an RS-232 cable is connected from the COM port on the computer running "HSMDC8" to the "PROG" port on the HSM-DC8.

The following sections are a complete description of the "HSMDC8" selections and menus.

MAIN MENU

The main menu of the "HSMDC8" set-up program incorporates the following menu selections:

1: Set Speed Parameters
2: Set Pin Chain/QC Blow-off Parameters
3: Set Machine Timing
4: Number of Trips per Spindle data
5: Current Shift Data
6: Last Shift Data
7: Download Program to module
8: Download Set-up data to module
9: Upload (Save) Set-up data from module

SECTION 4
"HSM-DC8" SET-UP PROGRAM REFERENCE

4.1 SET SPEED PARAMETERS

This selection is used to set the canfeed enable speed window and the calibration of the O'Varnish roll speed in the HSM-DC8. When selected, the "Set Speed Parameters Set-Up" menu is invoked.

Note: Prior to selecting this selection, make sure the RS-232 cable is connected to the COM port on the computer and to the PROG PORT on the HSM-DC8.

The "Set Speed Parameters Set-Up" Menu contains the following selections:

1: Set Canfeed Enable Low Speed
2: Set Canfeed Enable High Speed
3: Set O'Varnish Roll Speed Calibrate.

4.1.1 SET CANFEED ENABLE LOW SPEED

Canfeed Enable Low Speed: This is the minimum speed the can gate is allowed to open to enable cans to be loaded into the machine. This defines the lower limit of the canfeed enable window. As the machine speed increases above this threshold, the can gate will be enabled to be opened. The HSM-DC8 will activate/deactivate the can gate solenoid on the canfeed timing signal (CH03).

4.1.2 SET CANFEED ENABLE HIGH SPEED

Canfeed Enable High Speed: This is the maximum speed the can gate is allowed to open or close to enable cans to be loaded into the machine. This defines the upper limit of the canfeed enable window. With the machine operating at production speed, the HSM-DC8 will only activate/deactivate the can gate solenoid within the canfeed enable window. When the machine goes to a stand-by condition, the speed of the machine will need to be decreased below this threshold for the can gate solenoid to be deactivated. The HSM-DC8 will activate/deactivate the can gate solenoid on the canfeed timing signal (CH03).

4.1.3 SET O'VARNISH ROLL SPEED CALIBRATE

O'Varnish Roll Speed Calibrate: The O'Varnish drive speed input is a 0-10VDC signal from the O'Varnish drive (if available). The roll speed calibrate is used to scale this signal to display the "O'Varnish RPM". The number entered here should equal the O'Varnish roll speed when the drive is at full speed (input = 10VDC).

4.2 SET PIN CHAIN/QC BLOW-OFF PARAMETERS

This selection is used to set the pin chain/QC blow-off parameters in the HSM-DC8. When selected, the "Pin Chain/QC Blow-off Set-up" menu is invoked. Note: Prior to selecting this selection, make sure the RS-232 cable is connected from the COM port on the computer to the PROG PORT on the HSM-DC8.

The "Pin Chain/QC Blow-off Set-up" menu contains the following selections:

1: Set Bad Can (pin chain) blow-off response times
2: Set number of cans to blow-off pin chain
3: Set number of pins to pin chain blow-off port
4: Setup QC (select-a-can) blow-off

4.2.1 SET BAD CAN (PIN CHAIN) BLOW-OFF RESPONSE TIMES

Bad Can Blowoff solenoid "on" response time: This is the time used as the "on" response time of the pin chain blow-off port (time from "on" solenoid actuation to first air out port) in milliseconds. The HSM-DC8 will activate the solenoid this amount of time ahead of the Pin Chain blow-off timing (CH04) (usually set at 15 to 20 milliseconds).

Bad Can Blowoff solenoid "off" response time: This is the time used as the "off" response time of the pin chain blow-off port (time from "off" solenoid actuation to air stopping at port) in milliseconds. The HSM-DC8 will activate the solenoid this amount of time ahead of the Pin Chain blow-off timing (CH04) (usually set at 15 to 20 milliseconds for double acting solenoids and set at 25 to 30 milliseconds for single acting solenoids).

4.2.2 SET NUMBER OF CANS TO BLOW-OFF PIN CHAIN

# of bad cans to blowoff for misload: This is the number of cans blown off at the pin chain port when one mis-loaded can is detected (typically set at 1 can).

# of cans to blowoff from infeed open: This is the number of cans which will be blown off when the infeed is first opened. To blow off no cans at infeed open, set equal to 0, to blow off one can set equal to 1, etc.

# of cans to blowoff from print at restart: This is the number of cans which will be blown off from the print station when the machine is restarted. To blow off no cans at restart, set equal to 0, to blow off one can set equal to 1, etc.

# of cans to blowoff from varnish at restart: This is the number of cans which will be blown off from the varnish station when the machine is restarted. To blow off no cans at restart, set equal to 0, to blow off one can set equal to 1, etc.

4.2.3 SET NUMBER OF PINS TO PIN CHAIN BLOW-OFF PORT

# of pins to pin chain blowoff port: This is the number of pins from the spindle wheel to disk transfer location to the first can blown off at the Pin Chain blow-off port minus two. This can be a number from 0 to 999.

4.2.4 SET QC (SELECT-A-CAN) BLOW-OFF

QC Can Blowoff solenoid "on" response time: This is the time used as the "on" response time of the QC blow-off port (time from "on" solenoid actuation to first air out port) in milliseconds. The HSM-DC8 will activate the solenoid this amount of time ahead of the QC blow-off timing (CH05) (usually set at 15 to 20 milliseconds).

QC Can Blowoff solenoid "off" response time: This is the time used as the "off" response time of the QC blow-off port (time from "off" solenoid actuation to air stopping at port) in milliseconds. The HSM-DC8 will activate the solenoid this amount of time ahead of the QC blow-off timing (CH05) (usually set at 15 to 20 milliseconds for double acting solenoids and set at 25 to 30 milliseconds for single acting solenoids).

QC Can Blowoff port shift offset: This is the number of spindles difference from detection of the spindle #1 flag to the QC blow-off port. This is a number between 1 and 24 and is empirically set by selecting spindle #1 for blow-off and adjusting this value until the can from spindle #1 is the can that is blown off.

4.3 SET MACHINE TIMING

The Set Machine Timing selection is used to invoke the PLS programming command menus (these are the same menus used in SYSdev to program the PLS section of the HSM-DC8). When selected, the PLS programming main development menu will be invoked using the default "DC8TMG" channel set-point file. From this menu, the user can zero the machine (set the resolver offset) and adjust the timing signal set-points. The following sections describe how to perform these functions, section 5 provides a complete description of each timing signal.

Note: Prior to selecting the Machine Timing selection, make sure the RS-232 cable is connected from the COM port on the computer to the PROG PORT on the HSM-DC8.

4.3.1 SET MACHINE ZERO

To set the machine zero (resolver offset) perform the following:

1) Connect the RS-232 cable from the COM port on the computer to the "PROG" port on the HSM-DC8.

2) Select the "3: Set Machine Timing" selection from the HSM-DC8 set-up program main menu.

3) Select "1: Online Channel Setpoint Programming" from the Main Development menu.

4) Select "F9: POS/RPM" and observe the "POS:" field. Verify that as the machine is rotated forward (either jogging or barred) that the position increases linearly from 0 through 359. If not, swap the S1 and S3 leads of the resolver at the HSM-DC8 resolver connector. Then verify that the position then indeed does increase with forward movement. Press <ESC> to exit the "POS/RPM" update.

5) Position the machine at machine zero (odd trip cam follower just past odd trip cam, see the electrical timing procedure drawing, figure 3 at the back of this manual).

6) Auto zero the resolver by selecting "F10: Set Offset". Enter "0" in the offset field and press <ENTER>.

7) The HSM-DC8 will calculate the actual offset value required to make this the 000 position and will display this number in the offset field. The position will now read 0.

8) Exit back to the PLS Main Development menu by pressing <ESC>. Exit back to the "HSMDC8" set-up main menu by pressing <ESC> again.

4.3.2 ADJUSTING TIMING CHANNEL SET-POINTS

To set or alter any of the timing signal set-points, perform the following:

1) Connect the RS-232 cable from the COM port on the computer to the "PROG" port on the HSM-DC8.

2) Select the "3: Set Machine Timing" selection from the HSM-DC8 set-up program main menu.

3) Select "1: Online Channel Setpoint Programming" from the Main Development menu.

4) Set all channels per section 5. Set-points are entered for a particular channel simply by typing in the set-point in the form XXX-YYY<ENTER> in the first set-point of the given channel (Note: up to 50 set-points may be entered for any channel. However for the decorator only one set-point is used per channel and this should be entered in the number 1 set-point). The XXX is the location the set-point will turn "on" while YYY is the location where the set-point will turn "off". Use the PgUp, PgDn, F1:Next Chan, or F2: Prev Chan keys to select the desired channel for programming.

5) Once all channels are programmed, press <ESC> to exit back to the PLS Main Development Menu. Press <ESC> again to exit back to the "HSMDC8" set-up main menu. The new channels will be saved both in the module and in the "DC8TMG" file on the hard drive.

4.4 NUMBER OF TRIPS PER SPINDLE DATA

The Number of trips per spindle menu is provided to aid in the trouble-shooting of a loading problem with a spindle or spindles. The total number of trips for each spindle since the last reset or end of shift is displayed. The operator can reset these counts at anytime to aid in the trouble-shooting process. In addition, the "Spindle Trip Offset" can be entered from this menu. This is used to compensate for the location of the can/no can sensor and the spindle #1 I.D. sensor location.

Note: Prior to selecting this selection, make sure the RS-232 cable is connected from the COM port on the computer to the "PROG" port on the HSM-DC8.

The following data is displayed in the "Trips per Spindle" menu:

Spindle #xx Trips: This is the total number of trips for each spindle. This data is displayed and updated continuously in the respective field for each spindle. A disproportionately high count for a particular spindle indicates a loading problem for that spindle.

The menu selections on the "Trips Per Spindle" menu allow you to reset the trips per spindle counts or set the "Spindle Trip Shift Offset". The selections are listed below:

1: Set Spindle #1 trip offset
2: Reset Spindle trip counts

To set the spindle trip offset, select "1" and enter the required offset (see section 2.13.10) and press <ENTER>. To reset the spindle trip counts, simply press "2". The counts will be reset in the HSM-DC8. To exit back to the main menu, press <ESC>.

4.5 CURRENT SHIFT DATA

This selection is used to view the Current Shift data. This data is the totals so far into the shift. This data is transferred to the "Last shift" data when the end of shift input transfers from a "0" to a "1". This can be at the end of either an 8 or 12 hour shift or alternatively could be done at label changes such that the data collected would be for label runs rather than complete shifts. This data cannot be reset either from this menu or by the operator, only at the end of shift input transition. To exit back to the main menu, press <ESC>.

Note: Prior to selecting this selection, make sure the RS-232 cable is connected from the COM port on the computer to the PROG PORT on the HSM-DC8. The following data is displayed in the "Current Shift (Totals so far)" menu:

Total Good Cans: This is the total number of good cans printed so far into the shift. This is essentially a can counter.

Total Blow-offs: This is the total number of cans blown-off the machine. This includes all types of blow-offs: the three cans blown-off for every mis-loaded can, infeed open blow-offs, restart blow-offs, manual blow-offs, select-a-can QC blow-offs, etc.

Total Mis-loads: This is the total number of mis-loaded cans (trips). These would be the actual number of damaged cans that did not load properly on the machine. This gives an indication of conveying/can handling problems.

Restart Blow-offs: This is the total number of cans blown off when the infeed opened and from the print station and varnish station at machine restart.

Manual Blow-offs: This is the total number of cans blown-off by the operator using the Manual Blow-off PB or selector switch.

QC Blow-offs: This is the total number of cans blown-off by the operator with the Select-A-Can QC station or QC Blow-off key on the HSM-DC8 keypad for quality verification.

Spindle #01 trips thru Spindle #24 trips: This is the total trips (mis-loads) for each spindle. A disproportionately high count for a particular spindle indicates a loading problem for that spindle.

4.6 LAST SHIFT DATA

The "Last Shift" data is identical to the current shift data except it is for the previous 8 or 12 hour shift or previous label run, however the shift collection is set-up. This allows data collection and diagnostics to take place automatically over a two shift period. Refer to the previous section for definitions of the data fields in the "Last Shift" data menu.

4.7 DOWNLOAD PROGRAM TO MODULE

This selection is used to download the HSMDC8 application program to the HSM-DC8 module. This should only be performed when either replacing the module or when the program has been changed. To download the program, perform the following:

Note: Program download should not be performed while the decorator is running. All outputs on the HSM-DC8 are turned "off" and no program execution is performed. The decorator should therefore be stopped before the download takes place.

1) Connect the RS-232 cable from the COM port on the computer to the "PROG" port on the HSM-DC8.

2) Select "7: Download Program to Module" from the Main Menu. The current program ident, revision, and checksum for both the program on disk and already loaded in the module will be displayed. A prompt will be displayed asking to continue or abort. To continue, press any key except the <ESC> key. To abort, press the <ESC> key. If a prompt stating that the "HSMDC8" file could not be opened is displayed, then the "HSMDC8" application program is not installed in the current directory.

3) Once program download is initiated, HSM-DC8 program execution will cease, the current address being downloaded will be displayed, and the "RUN" LED on the module will flash continuously.

4) Once the download is complete, the "RUN" LED on the module will illuminate solid and program execution in the HSM-DC8 will resume. Press any key to return back to the "HSMDC8" main menu.

5) This selection can also be used to verify the program ident, revision, and checksum without downloading the program. Perform steps 1 thru 3 above but instead of initiating the download in step 3, simply press the <ESC> key to abort the download once the ident, revision, and checksum have been displayed.

4.8 DOWNLOAD SET-UP DATA TO MODULE

This selection is used to download the previously uploaded (saved) set-up variables to the HSM-DC8 module. This should only be performed when replacing the module.

Note: The set-up data consists of the speed parameters, pin chain/QC blow-off parameters and the spindle trip shift offset. Timing channel set-points are not stored as part of the set-up data, these are stored in the "DC8TMG" file.

To download the set-up data, perform the following:

1) Connect the RS-232 cable from the COM port on the computer to the "PROG" port on the HSM-DC8.

2) Select "8: Download Set-up data to Module". A prompt will be displayed asking to continue or abort. To continue, press any key except the <ESC> key. To abort, press the <ESC> key.

3) Once data download is initiated, the current address being downloaded will be displayed. Note that HSM-DC8 program execution is not ceased, therefore data download can be performed while the machine is running.

4) Once set-up data download is complete, press any key to return to the "HSMDC8" main menu.

4.9 UPLOAD (SAVE) SET-UP DATA FROM MODULE

This selection is used to save the set-up variables from the HSM-DC8 module to the hard drive (current directory selected). This should be performed anytime any of the set-up variables have been changed.

Note: When the set-up variables are changed, they are changed directly in the module, not on the file in the computer. By uploading (saving) the set-up variables to disk, they can be downloaded to the module in the event the module must be replaced.

The set-up data consists of the speed parameters, pin chain/QC blow-off parameters and the spindle trip shift offset. Timing channel set-points are not stored as part of the set-up data, these are stored in the "DC8TMG" file. To upload the set-up data, perform the following:

1) Connect the RS-232 cable from the COM port on the computer to the "PROG" port on the HSM-DC8.

2) Select "9: Upload (Save) Set-up data from Module". A prompt will be displayed asking to continue or abort. To continue, press any key except the <ESC> key. To abort, press the <ESC> key.

3) Once data upload is initiated, the current address being uploaded will be displayed. Note that HSM-DC8 program execution is not ceased, therefore data upload can be performed while the machine is running.

4) Once set-up data upload is complete, press any key to return to the "HSMDC8" main menu.

SECTION 5
GENERAL TIMING SIGNAL LOCATIONS

The following is a general description of the timing signals and the locations they should be set at:

CH00: Odd Trip Cam Timing: This signal should just turn “ON” when the odd trip cam follower has just passed the odd trip cam. With the machine zeroed properly, this is at 0 degrees. This signal should be 20 degrees wide, set at 0 to 20 degrees.

CH01: Even Trip Cam Timing: This signal should turn “ON” when the even trip cam follower has just passed the even trip cam. With the machine zeroed properly, this is at 180 degrees. This signal should be 20 degrees wide, set at 180 to 200 degrees.

CH02: Cam Reset Timing: This signal is used to reset either the odd or even trip cam which has been activated for a bad can and is to be reset for the next good can. This signal has 2 set points, 20 degrees wide, set at 140 to 160 degrees and 320 to 340 degrees.

CH03: Can Gate Timing: This signal is used to open and close the can gate. Set as necessary for proper can gating.

CH04: Pin Chain (Bad Can) Blow-off Timing: This should turn "on" when the chain blow-off port is centered between pins on the chain (see figure 4 of the electrical timing procedure drawing at the back of this manual). This signal should be 40 degrees wide.

CH05: QC (Select-A-Can) Blow-off Timing: This should turn "on" when the select-a-can chain blow-off port is centered between pins on the chain (see figure 4 of the electrical timing procedure drawing at the back of this manual). This signal should be 40 degrees wide.

CH06: PLC Clock Timing: This signal is provided to the PLC via a discrete DC output. This is used for whatever purpose required by the host PLC to clock once per spindle data. In general this should be set "on" for 180 degrees and "off" for 180 degrees. Otherwise set as desired. This signal is not used by the HSM-DC8 package internally in any way.

CH07: Blow-off Data Clock: This signal is provided to the PLC via a discrete DC output. This is used to clock blow-off data.

SECTION 5
GENERAL TIMING SIGNAL LOCATIONS

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SECTION 6
RECOMMENDED SPARE PARTS

The following are recommended spares for the HSM-DC8. These parts are available through Systems Engineering Assoc. Inc.

Quantity	Part Number	Description
1ea.	HSM-DC8	Ragsdale (APM) Decorator High Speed Logic Module

SECTION 6
RECOMMENDED SPARE PARTS

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